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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/710,629

07/26/2004

Liqin Wang

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PUS)

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EXAMINER

ARTMAN, THOMAS R

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 01/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. 10/710,629	Applicant(s) WANG ET AL.	
Examiner Thomas R. Artman	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 26 July 2004.
- 2a) This action is **FINAL**.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-23 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 21-23 is/are allowed.
- 6) Claim(s) 1-20 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 26 July 2004 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a) because they fail to show the details as to: a) how the stem 76 is connected to the housing 52, and b) what is rotating and what is stationary (e.g., what is the heat shield attached to?), as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Art Unit: 2882

The drawings are objected to under 37 CFR 1.83(b) because they are incomplete. 37

CFR 1.83(b) reads as follows:

When the invention consists of an improvement on an old machine the drawing must when possible exhibit, in one or more views, the improved portion itself, disconnected from the old structure, and also in another view, so much only of the old structure as will suffice to show the connection of the invention therewith.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Fig.3 does not have the label "96" for the holes in the heat shield, as described in par.32 of the specification.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should

Art Unit: 2882

include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Fig.3 has a reference number "100" for specifying the holes in the heat shield. This number does not exist in the specification. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities: item number 96 is used to reference the holes in the heat shield of Fig.3 and is also used to reference a set of bars in the graph of Fig.5. It appears as though the holes should be referenced with "100", as is shown in Fig.3.

Appropriate correction is required.

The disclosure is objected to because of the following informalities: the term "glidcup" is stated in the specification (pars. 0025-0026) in the context of comparing appropriate materials for bearing structures. The term is not understood by the examiner, the term is not defined in the specification, and the term (and variations thereof) does not exist in the entirety of the published patents and patent application records at the USPTO (see PAIR to review the examiner's search notes of record as evidence for this assertion). The term is therefore not a term of art and is thus causing confusion. The examiner requests that the term be defined in the specification or replaced with an appropriate term.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 9, 10, 17 and 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 9 requires that a “radial height of the heat shield is less than a predetermined height for thermal energy passage between said anode and said at least one bearing of greater than a predetermined threshold.” Claims 10, 17 and 20 also require that the “radial height of said heat shield is less than a predetermined height for temperature continuity between bearings...” The accompanying supporting description appears in paragraph 0031. The description states that the heat shield has a “radial height H that is less than a predetermined height for thermal energy passage between the anode and the bearings to a certain extent.” Nowhere in the specification does Applicant provide sufficient disclosure or guidance for one of ordinary skill in the art to make the determination or calculate the “radial height” of claim 9 as a function of the thermal energy transfer between the anode and the bearings, or to make the determination or calculate the “radial height” of claims 10, 17 and 20 as a function of the temperature relationship between bearings. Therefore, the examiner has concluded that the specification is not enabling for one of ordinary skill in the art to make the invention.

Art Unit: 2882

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9, 10, 17 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

All four claims refer to a dimension of the heat shield being a “radial height.” This term does not make sense in standard mathematical terms, and is therefore confusing and unclear to the skilled artisan. Furthermore, as shown in Fig.3 and described in paragraph 31, the “radial height H” is not in the radial direction of the rotating anode assembly. The dimension H is longitudinal, that is to say, it is perpendicular to the radial plane. Thus, “H” is a “length” or a “height” and is completely independent of the radial dimension. In short, the term “radial height” is repugnant to standard mathematics and creates significant ambiguity regarding what Applicant regards as the invention. Perhaps deleting the term “radial” (in the specification as well as the claims) would dispel the confusion.

Claims 3 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3 and 5 contains the trademark/trade names “36 alloy, 39 alloy...Ceramvar Alloy and Inco 909.” Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The

Art Unit: 2882

claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe iron-nickel alloys and, accordingly, the identification/description is indefinite. Accordingly, these terms are not afforded any patentable weight. The above claims are merely limited to an "alloy", which is the first item in the list claimed. The remaining items are trade names which will not be considered. Therefore, any alloy (any metallic compound having two or more metallic elements in the composition) can read on the claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuzniar (US 6,295,338 B1).

Regarding claim 1, Kunziar discloses an anode assembly (Fig.3), including:

a) a thermally conductive bearing encasement 100, 102 and 104 covering at least a portion of at least one bearing 64, 65,

Art Unit: 2882

b) an anode 24 rotating on the at least one bearing and having a target 30 with an associated focal spot (not labeled, opposite cathode 23), where

c) the thermally conductive bearing encasement is expansion limited, which prevents displacement of the focal spot (col.9, line 55 through col.10, line 3).

Regarding claim 16, Kunziar discloses an X-ray source (Figs.3 and 4), including:

a) a cathode 23 emitting electrons,

b) a thermally conductive bearing encasement 102, 104 being made of at least one alloy material (col.9, line 55 through col.10, line 3) and covering at least a portion of at least one bearing 64, 65,

c) an anode 24 rotating on the at least one bearing and having a target 30 where the electrons impinge to generate X-rays from an associated focal spot (not labeled, opposite cathode 23),

d) a thermal shield 216 residing between the thermally conductive bearing encasement and the anode, where

e) the bearing encasement and the thermal shield are configured and expansion limited, which prevents displacement of the focal spot (col.9, line 55 through col.10, line 3; col.12, line 65 through col.13, line 25).

With respect to claims 2-4, Kunziar further discloses that the bearing encasement comprises a thermally conductive stem 102 made of an alloy, specifically of iron, nickel and cobalt (Kovar, col.9, line 55 through col.10, line 3).

Art Unit: 2882

With respect to claims 5-7, Kunziar further discloses that the bearing encasement comprises a thermally conductive housing 104 made of an alloy, specifically of iron, nickel and cobalt (col.9, line 55 through col.10, line 3).

With respect to claims 8-10 and 17, Kunziar further discloses a heat shield 216 (Fig.4) that prevents thermal energy transfer between the anode and the bearings and is sufficiently dimensioned in order to appropriately redirect heat flow from the bearings (col.12, line 45 through col.13, line 25).

With respect to claims 11, 12 and 18, Kunziar further discloses that the heat shield has at least one hole 221, which allows thermal energy transfer between the anode and the bearing.

With respect to claims 13 and 14, Kunziar further discloses that the thermally conductive bearing encasement and the heat shield maintain operating temperatures of the at least one bearing to approximately 400 degrees Centigrade (col.2, lines 37-49).

With respect to claim 15, Kunziar further discloses that the thermally conductive bearing encasement prevents displacement of the focal spot in any direction (col.9, line 55 through col.10, line 3).

Art Unit: 2882

Regarding claim 19, Kunziar discloses an imaging system, including:

- a) an X-ray source (Figs.3 and 4) having:
- b) a cathode 23 emitting electrons,
- c) a thermally conductive bearing encasement 100, 102, 104 having at least one alloy material (col.9, line 55 through col.10, line 3) and covering at least a portion of at least one bearing 64, 65 (Fig.3),
- d) an anode 24 rotating on the at least one bearing and having a target 30 whereupon the electrons impinge to generate X-rays with an associated focal spot (not labeled, across from cathode 23), and
- e) a thermal shield 216 residing between the bearing encasement and the anode, where
- f) the thermally conductive bearing encasement is expansion limited, which prevents displacement of the focal spot (col.9, line 55 through col.10, line 3), and where
- g) the focal spot displacement is necessarily less than 700 μm .

With respect to claim 20, Kunziar further teaches that the heat shield comprises at least one hole 221 where thermal energy is transferred, and further that the heat shield is sufficiently dimensioned in order to appropriately redirect heat flow from the bearings (col.12, line 45 through col.13, line 25).

Allowable Subject Matter

Claims 21-23 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record neither teaches nor reasonably suggests the method of determining a control alloy expansion material for the thermally conductive bearing encasement by the material's elastic modulus and thermal expansion coefficient, where the necessary elastic modulus and thermal expansion coefficient are determined by a maximum allowable focal spot displacement, as required by the combination as claimed in claim 21.

Claims 22 and 23 are allowed by virtue of their dependency.

The best prior art of record, Andrews (US 2005/0243969 A1) teaches the practice of measuring the focal spot displacement as part of a feedback loop in order to change the characteristics of the cooling system, but does not select specific materials by these properties based upon the focal spot displacement.

Andrews (US 6,480,571 B1) teaches the practice of selecting the appropriate controlled expansion alloys by strength (i.e., elastic modulus) and by thermal expansion coefficients for various parts of a rotating anode system in order to minimize focal spot displacement (see at least col.3, line 56 through col.4, line 8; col.7, lines 41-64). However, the materials are not for use in the bearing encasement, and further, Andrews does not suggest any significance for the bearing encasement or even the material of which the bearing encasement is made.

Art Unit: 2882

In fact, the prior art of record in general places little emphasis on the bearing encasements beyond thermal conductivity, which is a material property that is substantially different from thermal expansion.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Snyder (US 6,477,231 B2) shows a heat shield.

Langer (US 3,855,492), Higgins (US 6,735,281 B2), Hansen (US 6,553,097 B2), Lauwasser (US 3,956,653), Eberberger (US 4,504,965) and Jackson (US 5,699,401) teach the use of nickel-based alloys for various parts of rotating anode structures, including the portion of the vacuum envelope near the structure, for reasons of high temperatures and stresses; however, none teach the use of such materials for bearing encasements. Higgins further teaches the definition of a stem 108, Fig.5.

Wandke (US 6,445,770 B1) teaches the significance of maintaining constant bearing temperatures.

Lu (US 6,603,834 B1) teaches the background to thermal issues with bearings and how those issues relate to focal spot displacement.

Anno (US 6,477,236 B1) teaches a thermally-conductive bearing encasement made of a nickel-based superalloy.

Art Unit: 2882


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485.

The examiner can normally be reached on 9am - 5:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thomas R. Artman
Patent Examiner



EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER